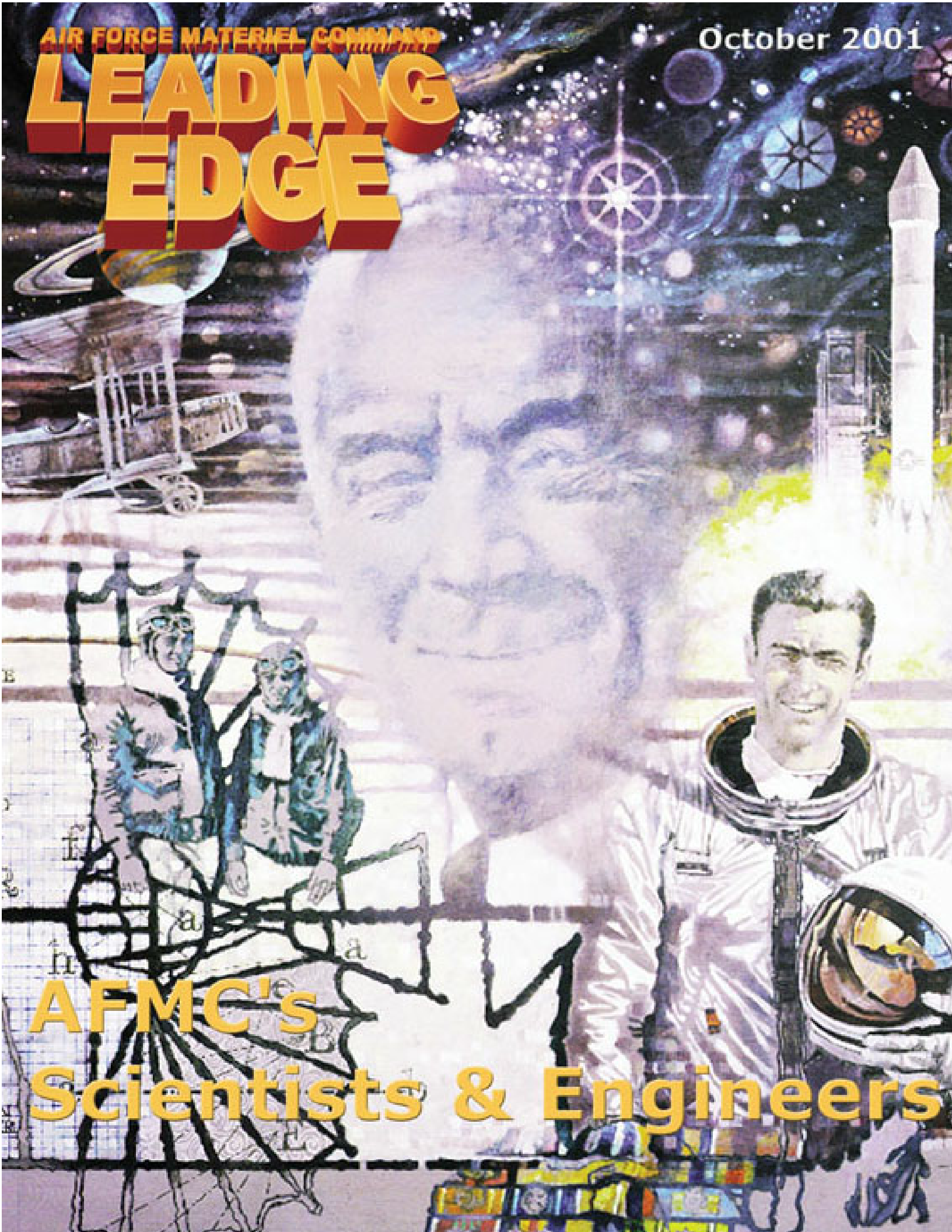
AIR FORCE MATERIEL COMMAND

LEADING EDGE

October 2001



AFMC's Scientists & Engineers

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LEADING EDGE

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AFMC
AIR FORCE MATERIEL COMMAND

Cover Stories

The cover is an Air Force Art program painting by Mr. Ted Coconis and symbolizes the seamless integration of air and space in tomorrow's Air Force. AFMC scientists and engineers make that integration a reality.

4 - 15 AFMC Scientists and Engineers

AFMC engineers are meeting challenges of the 21st Century with amazing programs and technologies to develop, acquire, sustain and maintain AFMC systems and programs. Turn the page to see how AFMC is the champion for developing and operating advanced technologies.

Mission Progress

Features

Departments

Turn to page 23 to read how Senior Airman Elisabeth Applegate puts her musical training to good use in the Air National Guard.

Correction: The Leading Edge staff mistakenly referred to Brig. Gen. Chuck Yeager as the author of the book *Flight Testing At Edwards — Flight Test Engineers' Stories 1946-1975*, when in fact he only wrote the introduction.

F-22 passes latest test

WRIGHT-PATTERSON AIR FORCE BASE, Ohio —- A successful F-22 Raptor live fire test held here recently completes an objective toward operational deployment of the Air Force's newest fighter airplane. F-22 program officials said the test, conducted as if the aircraft was in flight and had been hit by an anti-aircraft artillery round, was used to evaluate the structural design.

Computer controlled hydraulic jacks pushed against the wings to simulate flight loads of a maneuvering airplane. A battery of jet engines blew high-velocity-air.

High-speed photography captured results of the high-explosive incendiary round hitting the aircraft. It will be viewed in slow motion to see the detailed effects of the exploding round. Testers also collected numerous other measurements to aid in understanding test results

The wings were loaded with fuel, flight loads and airflow applied, lights and cameras were turned on, and the round fired and exploded within the wing fuel tank. The bullet generated a shock wave that traveled through the fuel and imparted loads on the wing's skin and internal structure. A portion of the wing skin deformed into the air stream and then ripped off. The damaged wing remained largely intact due to unique features of the F-22 wing design, which would enable a pilot to fly the airplane home.

Additional tests will be conducted to determine remaining flight capability of the damaged wing, applying even higher flight loads.

— Information provided by ASC Public Affairs

F100 test provides insight to future performance

ARNOLD AIR FORCE BASE, Tenn. — Validating design improvements to enhance flight safety and reduce operational maintenance are what test team members here accomplished by putting the engine that powers F-15 and F-16 fighters through its paces.

A combined Arnold Engineering Development Center, Pratt & Whitney and Sverdrup test team performed accelerated mission tests and accelerated mission test cycles on the F100-PW-229 engine that has been powering advanced versions of the F-15 and F-16 aircraft.

The team obtained data on the engine's performance, durability and reliability during simulated missions. The 12-month program also included high-cycle fatigue testing to further validate engine hardware integrity.

The missions and conditions occuring during flight operations determine engine deterioration and wear. Elevated inlet pressures and temperatures occurring in the aircraft are simulated during this endurance testing, accurately simulating operational engines for 4,300 total accumulated cycles. A full engine overhaul is required afterward.

After AEDC test completion, the engine will be shipped to P&W test facilities in East Hartford, Conn., for high-cycle fatigue testing. From there, the engine will go to the company's Middletown, Conn., facility for full engine teardown and analytical condition inspection that provides a rigorous evaluation of all hardware for damage or wear.

— Information provided by AEDC Public Affairs

Early delivery for seventh consecutive Joint STARS

HANSCOM AIR FORCE BASE, Mass. — Electronic Systems Center officials delivered the first Block 20 E-8C Joint Surveillance Target Attack Radar System production aircraft, better known as Joint STARS, to the 93rd Air Control Wing at Robins AFB, Ga., in August.

This is the seventh consecutive time ESC has delivered a Joint STARS E-8C ahead of schedule. The most significant enhancement delivered in Block 20 is the computer replacement program, which has reduced the number of on-board main computers from five to two while increasing processing power and speed. It also offers a fiber optic local area network that provides greater bandwidth, speed and reliability.

Delivering the aircraft in ready-to-go status is a cooperative effort among prime contractor Northrop Grumman, the joint program office and the 93rd Air Control Wing.

The team joined with the on-site Defense Contract Management personnel, working to accelerate acceptance inspection. The Joint STARS Test Force, co-located with Northrop Grumman in Melbourne, Fla., also played a key role in preparing the plane for early delivery by flying test sorties.

— Information provided by ESC Public Affairs

Microsatellite launch system earns patent

KIRTLAND AIR FORCE BASE, N.M. – A modular cargo aircraft pneumatic launch tube to deploy reusable launch vehicles into low-earth-orbit may be the future of a new generation of launch systems, according to researchers at the Air Force Research Laboratory's Space Vehicles Directorate here.

The newly-patented launch concept can add a unique space launch capability to existing military cargo aircraft, possibly avoiding costly development of specially modified carrier launch aircraft and expensive construction of new runways, launch pads and vehicle processing facilities.

The modular launch tube could be designed to reconfigure the aircraft from space launch to normal cargo modes in less than a day.

Microsatellites, a concept AFRL is investigating for implementation, are categorized as weighing less than 220 pounds and can operate individually or in clustered formations.

The lab has been exploring launch concepts capable of low flight cost, high reliability, and quick ground turn-around times.

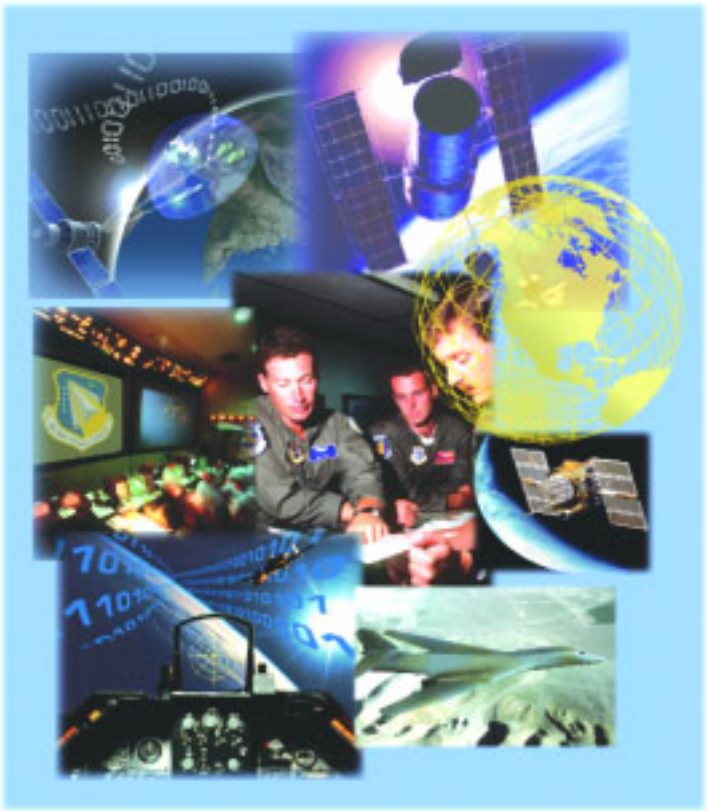
— Information provided by AFRL Public Affairs

Meeting challenges of the 21st Century

— General Lester Lyles
Commander
Air Force Materiel Command

There are a lot of things going on today in Air Force Materiel Command – a lot of exciting things! I think there are still even more exciting prospects for the future of our Air Force and certainly for us in AFMC with the amazing programs and technologies our scientists and engineers develop, acquire, sustain and maintain.

In fact, this is such an important aspect of the Air Force mission we developed the Scientists and Engineer CONOPS which provides the foundation of how we will employ this vital element of our workforce. It also outlines our objective to evolve our aerospace force to ensure we sustain our technological dominance and finally, it underlines our conviction that a strong in-house scientist and engineer capability is essential to meet our national security demands of the future.



This command has nearly 11,000 scientist and engineering positions in an extremely wide variety of disciplines that keep us on the cutting edge of technology. Whether it's a civil engineer working as a licensed architect ensuring our infrastructure is updated and efficient, an electrical engineer designing the next generation internet or a physicist developing the latest directed energy laser systems, these bright and capable individuals eagerly accept the challenge, the opportunity and the responsibility to keep us on the forefront of technological development and application.

It's no secret that if the Air Force is to meet 21st Century challenges, including asymmetric threats, we must rely on overwhelming technological leadership and an intrinsic ability to respond quickly to the demands of a rapidly changing world.

To ensure that happens, one of my key objectives is to continue our key leadership role in technology. AFMC will be a champion for science and technology; becoming the advocate and ally for leveraging new technologies. And that's in every aspect of our business, from command and control and aeronautical systems to space systems, armaments and our infrastructure.

I can say today, with great confidence, that we are clearly leaving our mark and providing technologies that directly support the warfighter.

The people making that possible now and in the future are our scientists and engineers. They are the backbone, really, of everything that we're trying to accomplish in our support to the warfighter. Our S&E workforce is having a tremendous impact on everything we do in the Air Force, both what we have currently in the hands of our warfighters and what we'll have in the future.

It is these talented people who will enable a continuing world-class technology dominance, which will provide a steady infusion of new technology to our warfighters.

As a matter of fact, wherever you look across our diverse mission, there is almost a direct conduit of the programs and technologies being developed and applied by our scientists and engineers. We are trying to make sure we are not only working on those technologies, but we can quickly get them into the hands of the warfighter.

Whether it's developing information technologies designed to create a global information grid, manufacturing vehicle structures using components and alloys like aluminum lithium, or taking advantage of emerging technologies to minimize the amount of waste generated by our facilities, we need to continue evolving as far as our technological realms are concerned. Our scientists and engineers are leading that evolution.

Our scientists and engineers are national treasures. Part of my job is to ensure support by the Air Force leadership for them and their great ideas.

This issue of the Leading Edge is a perfect place to showcase the talents and accomplishments of the scientists and engineers in AFMC.

As you explore these pages and read about the exploits of our engineers, realize that we have a proud history of strong in-house scientific and engineering capability to develop, test, maintain and operate superior weapons systems. At the same time we're ensuring our infrastructure is sized, configured and updated to provide effective, reliable and efficient support to our many missions in AFMC.

I think you will see that AFMC will vigorously pursue its role of developing, sustaining and operating advanced technologies!

Air Force Materiel Command scientists and engineers

Providing the foundation for future capabilities

— By Mr. James Papa
Director, Engineering and Technical
Management Directorate

Air Force Materiel Command's mission is developing and sustaining technologies and weapon systems to keep America's war fighters capable of defending freedom anywhere, any time.

To do that, we need top-notch people in all areas, especially scientists and engineers, or S&E's. These people support all of the Air Force core competencies, which is how we go about getting our job done.

AFMC's scientists and engineers sustain the Air Force core values of Precision Engagement, Rapid Global Mobility, Air and Space Superiority and Global Attack. Our S&E's work on compact sensors, creative ordnance, control theory and command and control systems to support Precision Engagement. Air and Space Superiority and Rapid Global Mobility depend on command and control systems, high-performance engines and airframes, stealth and cockpit automation, while Global Attack depends on high-efficiency engines, global secure communications, and intelligence networks, all of which involve AFMC scientists and engineers.

Dr. Michael Hayduk, Air Force Research Laboratory Sensors Directorate, works on the development of a tunable femtosecond laser operationg at 1550 nanometers. (Courtesy photo)

Our Air Force scientists and engineers are essential, as the Air Force becomes the technology force of the future. They provide technical oversight to protect service interests, insight to manage technology programs within acceptable risk, technical competency to support weapon systems long term, and integration to translate user needs into plans we can provide a contractor to build for us.

In July, Secretary of the Air Force Dr. James Roche and then Chief of Staff Gen. Michael Ryan, approved a concept of operations, or CONOPs, for S&Es. You may ask, why is that important and why is one needed at all? This CONOPs is a touchstone document describing our vision of sustained technological dominance—it provides for the employment of the S&E workforce through the year 2020 and beyond.

This plan reinforces that we must develop people to ensure a solid foundation for our aerospace force. To accomplish the mission, we must have the right number of motivated, trained people with the right skills. The aerospace force of today and tomorrow requires that we recruit, retain, and develop highly skilled and knowledgeable technical professionals.

Within AFMC there are 10,580 scientist and engineering positions, which are about 70 percent of the total Air Force numbers. Our S&E workforce is 82 percent civilian and 18 percent military. Our current civilian manning appears to be healthy, but we've got to take a long, hard look at the future because approximately 25 percent of our scientists and engineers are eligible to retire in the next five years.

We currently have the most experienced and well-trained civilian force we've ever had. Our problem is we have very few people with less than 10 years experience, and these are the people we should be grooming for future leadership positions.

We're projecting that we'll have to hire 3,300 civilian scientists and engineers in the next few years to help fill potential and real gaps. And we recognize that we have a real compensation problem in competing for new talent and retaining existing employees. For that reason we are pursuing special salary rates and other tools to help us recruit and retain our scientists and engineers.

For military scientists and engineers, we have a slightly different problem. We're unable to recruit and retain enough to meet our requirements. We are currently accessing a little more than 50 percent of what we need, and our loss rate has increased nearly fourfold since 1989.

Overall, we're manned at 69 percent of what's authorized in the military engineering career field and 81 percent in the military scientist career field. Add to that the fact that many of our trained scientists and engineers are valued transferees to other career fields, and the result is the lowest non-rated career field retention rate in the Air Force. While these transfers lead to very technically qualified personnel in other career fields, it results in fewer well-qualified scientists and engineers available for senior positions in the engineering career field.

These issues and others were addressed at the Scientist and Engineer Summit held in December 2000. Both the Secretary of the Air Force and chief of staff attended.

From that meeting, we took away some action items: To establish a functional manager for the scientist and engineer workforce at the three-star level in the Pentagon, who is Lt. Gen. Stephen Plummer, principal deputy for acquisition and military director of the Air Force Scientific Advisory Board; develop a Concept of Operations for this workforce which is complete; conduct a requirements review by October 2001; and bring this all back together to a Scientist and Engineer Summit II scheduled for December 2001.

The following issues were identified prior to the first summit but remain to be resolved:

Military and civilian compensation
Military and civilian career paths
Supervisory training
Advanced academic degrees
Civilian hiring timelines

These are the issues I believe must be addressed to improve our manning problems because without our scientists and engineers, AFMC would not be able to develop and sustain technologies and weapon systems to keep America's war fighters capable of defending freedom anywhere, any time.

AFMC Civil Engineers

Operating quality installations

— Capt. Gordon Taylor
AFMC Program Manager

A large and complex command, Air Force Materiel Command operates and maintains 10 major installations containing eight airfields, 17,000 facilities, 12,000 housing units, 6,000 dormitory rooms and almost two million acres of land.

The physical plant, exclusive of land, is valued at more than $49 billion. The responsibility for operating, sustaining, restoring and modernizing facilities and associated infrastructure rests with AFMC civil engineers.

Employing more than 500 military and civilian degreed engineers, architects and scientists, many AFMC positions require specific degrees, such as civil, mechanical, electrical or environmental engineering; chemistry, biology, or other environmental sciences; and architecture. Other positions require the foundation of any engineering or scientific discipline with a demonstrated ability to lead and manage complex tasks.

The primary focus for civil engineers is in achieving the command's strategic goal of operating quality installations. "The Air Force's missions simply would not get done without civil engineers," said Brig. Gen. David Cannan, AFMC Civil Engineer. "Without the facilities and infrastructure each mission needs to function, everything would stop.

"More importantly to us, however, is that we contribute so much to the quality of life for our military and civilian members," he said. "We're proud of our role and the vital contribution we make daily to AFMC and the Air Force."

In performing their mission, civil engineers display one or more of five core competencies outlined in the civil engineer strategic plan: installation engineering, housing excellence, expeditionary engineering, environmental leadership and emergency services.

Installation Engineering

Installation engineering is developing, operating, sustaining, restoring and protecting bases, infrastructure and facilities. With limited funding resources, civil engineers invest strategically based on mission and economic considerations.

AFMC programmers focus on sustainment-based life-cycle modeling of roofs, utilities, equipment, finishes, paint and other attributes of support facilities. In addition, they build a restoration and modernization program for facilities to meet customer's expectations of quality and service unique to the Air Force.

Analysts quantify the condition of every facility and work with customers to assess mission impact. Once a program is funded, engineers at base level execute the design. Once design is incorporated and a contract is awarded, civil engineering construction managers ensure the project is completed per the design specifications.

For example, Mr. Billy Waites, a project manager civil engineer at Arnold Engineering Development Center, Tenn., led design and construction of new $10.7 million cooling towers.

Mr. Billy Waites, (right), construction project manager at Arnold Engineering and Development Center, Tenn., looks at blueprints for upgrading the Aeropropulsion Systems Facility cooling towers with Mr. Bobby Tucker, U.S. Army Corps of Engineers (middle) and Mr. JonPaul Wallace, AEDC mission support contractor (left).

The towers are critical to the aeropropulsion systems test facility providing modeling and testing for aircraft. The completed construction improved cooling capacity of the towers, and will save AEDC an estimated $1.6 million annually.

Housing Excellence

Housing excellence focuses on providing quality homes for personnel and their families. AFMC supports the Air Force quality of life initiative to provide housing comparable to the private sector through privatization, revitalization and new construction at each of its installations.

The Air Force goal is to bring housing inventories up to contemporary standards, develop strong communities with an emphasis on neighborhoods, create safe and secure housing areas and provide durable, low maintenance and energy efficient housing. These needs are addressed through two plans.

The dynamic family housing master plan identified 65,000 housing units out of Air Force inventory needing revitalization by 2010, and the dormitory master plan calls for providing adequate housing for all junior enlisted members by 2009.

To succeed, these plans require accurate condition reports, proper investment, reliable project execution and appropriate use of competitive sourcing and privatization.

Expeditionary Engineering

Expeditionary engineering encompasses all mobility forces, associated training and equipping infrastructure required for rapid global deployment and employment of our forces, to include military, civilian and contingency contracting personnel. These forces beddown, defend, recover, reconstitute and provide engineering capabilities to support aerospace power across the globe. Their goal is to improve expeditionary quality of life, force protection and theater engineering capabilities.

Expeditionary engineering involves exploiting benefits of partnering with others, to include participating in foreign military sales to bolster our allies achieve national defense interests.

Currently in Saudi Arabia and Egypt, engineers work within cultural and religious disparity, having daily interaction with military leadership of host nations and construction firms staffed with local nationals. The foreign military engineer must be professionally competent as well as diplomatic to successfully build working coalitions between diverse foreign and domestic.

In addition, engineers support the Air Expeditionary Force to hone skills in contingency environments. Forty-two Prime Base Engineer Emergency Force, or prime beef, members from the 78th Civil Engineer Group led by Lt. Col. Thomas Sobieski, deployed to Honduras for 30 days in January

They installed power, electrical, water and wastewater distribution systems; set up showers and latrines; and constructed tent pads to support 650 personnel for a five-month period. The three civil engineering officers deployed had degrees and experience in environmental, electrical and structural engineering, and provided oversight to the various tasks.

"We put together equipment and material lists, made travel plans, and even came up with our own base camp layout," said Lt. Scott Breece. "At the end of each day we would bring all of the team chiefs together and update how each was doing with their tasks. Overall, it was a great experience."

"The primary reason Prime BEEF engineer emergency force exists is to support our forces in the field — regardless how remote the site," said Col. Michael Norrie, 78th CEG commander. "As our current force evolves more and more into the AEF structure, I think this contingency capability that we've developed over the last 30 plus years becomes more and more important."

Lt. Col. Thomas Sobieski, 78th Civil Engineer Group Prime Base Engineering Emergency Force, deployed to Honduras this past January to support personnel there. Civil engineers support the Air Expeditionary Force by installing power, electrical, water and wastewater distribution systems. (Photo by Ms. Sue Sapp, WR-ALC)

Environmental Leadership

Environmental leadership crosses all other core competencies in civil engineering. Environmental engineers and scientists are responsible for providing an environmentally secure and sustainable operating infrastructure and responsive workforce to conserve Air Force resources, ranges and airspace, while maintaining an operating state to meet its training and warfighting mission. Technical considerations involve maintaining compliance with strict environmental standards through monitoring air emissions, water sampling and ground sampling.

When remediation is required for past Air Force practices that harmed the environment, engineers call upon modern cleanup processes and risk assessment to ensure the clean-up is done safely and within budget, using an array of modeling, technical processes and verification.

Environmental engineers are also concerned with noise levels and establish contours surrounding AFMC flight operations, while considering socioeconomic benefits as part of the overall environmental impact analysis process.

At larger AFMC installations, environmental functions are centralized within an environmental management directorate. At smaller installations, an environmental flight reports to the base civil engineer. Environmental engineers and scientists are responsible for four primary tasks:

— Ensuring installations operate in compliance with applicable legal requirements, environmental permits and operational guidance.

— Ensuring good stewardship of natural and cultural resources and assisting leadership in the planning of future actions.

— Ensuring all areas contaminated by prior missions are properly cleaned up and restored to an environmentally healthy condition.

— Taking advantage of emerging technologies to minimize the amount of waste generated by ongoing installation operations.

Environmental leadership requires AFMC to create and promote a responsive work force through comprehensive training, awareness and situational monitoring in order to establish a culture where stewardship of environmental resources is at the same level of consciousness as safety and physical fitness.

However, environmental leadership crosses all boundaries of function, organization and service — there is no single owner of the process. All Air Force personnel have an essential role in meeting our environmental responsibilities.

Another aspect is the responsibility to be proactive when it come to fostering environmental awareness. Environmental engineers like Mr. Joe O'Keefe of Hanscom AFB, Ma., take special pride in partnering with educational institutions, state and local governments and community action groups providing innovative support for environmental initiatives.

Hanscom has been recognized for its work in protecting the headwaters of the Shawsheen River, a source of drinking water for surrounding communities. "We're committed to getting our message out and forging a strong bond between the base and local community," said Mr. O'Keefe.

The task at hand before the AFMC Civil Engineer is complex. Developing core competencies of installation engineering, housing excellence, expeditionary engineering, environmental leadership and emergency services play a significant role in empowering civil engineers to achieve the strategic goal of operating quality installations.

Civil engineers support the warfighter, produce a sense of community and uphold quality of life standards, while striving to ensure customers receive the best of what we have to offer under current budget and regulatory constraints. AFMC civil engineers remain poised and postured to continue providing quality support to their customers, overcoming the challenges of the future.

Hill engineers take flight simulation into the future

Imagine you're a new USAF engineer who just inherited a 16-year-old flight simulator and thousands of dollars in hardware and software.

Once you start digging under the hood, you discover that the Atari-era graphic engine needs a complete overhaul, the electrical system is on life support and it'll probably take your entire three-year tour to bring this relic up to modern standards.

First Lieutenant's Alan Blanchard and Jason Woodward, aero-performance engineers at the mature and proven aircraft directorate at Hill Air Force Base, Utah, took the challenge to "leverage technology" using "commercial off-the-shelf software" to create a "cheaper, faster and better" flight simulator.

The problem was simple — they needed a flight simulator to support their aero-performance mission, that creates accurate visualizations of aircraft mishaps for review boards, generates engineering data for analysis and able to fly a variety of aircraft. The present system was a decent T-38 Talon simulator, but that was the extent of its repertoire.

The new simulator had to be a quantum leap greater than the present system in terms of graphical quality and flexibility.

Quest for a new simulator

The personal computer flight simulation software market was the logical place for these engineers to start looking, as flight simulators are getting more realistic every year.

Microsoft Flight Simulator series is the reigning king of commercial flight simulators. Although its software has outstanding graphics, the flight models are "static" and aren't related at all to the shape of the aircraft or wing geometry. In other words, you could assign an SR-71 flight model to a brick and fly it over a realistic looking Russia at supersonic speeds.

Fun, but not realistic. To use this type of flight simulator program successfully, the engineers would have to develop accurate flight models for each of the directorate's aircraft.

Further research led to "X-Plane" software, which was developed to generate realistic flight, not just pretty graphics. Using "blade element theory" the virtual aircraft in X-Plane react to the forces and moments calculated for the flow over each section of the plane — a "dynamic" flight simulator.

Top: First Lieutenant's Jason Woodward and Alan Blanchard show off the cockpit view of a T-38 Talon on the flight simulator they designed to replace an antiquated system. Right: The Legacy T-38 Flight Simulator was state-of-the-art in 1985, but wasn't equipped for the 21st century. (Courtesy photos)

X-Plane includes the design tools that the engineers needed to create the aircraft they desired. Although the graphics in X-Plane are not quite as stunning as other simulation software, they are light years ahead of the present flight simulator.

Potential uses

Because this new method of flight simulation runs on a typical computer, the engineers' virtual aircraft have many potential uses in the Air Force.

For instance, during mishap investigations, flights can be quickly reconstructed using a laptop and joystick. The data could then be sent to engineers for analysis, and movie data sent to safety board members — a quick and efficient way of disseminating information.

Numerous training opportunities open up with a personal computer-based flight simulator. In the classroom, both proper and improper flight maneuvers can be shown to student pilots. Instructors could fly a maneuver in real time and using replay capabilities, could walk the audience through the maneuver.

Because most engineers don't fly, this simulator allows them to "connect" with the aircraft they support by virtually flying them. And these "aircraft" are a great recruiting tool. Anyone interested in joining the Air Force team can virtually fly any of the modeled aircraft.

In the end, these engineers have successfully replaced a dying flight simulation system with commercial software.

Judge for yourself

If you'd like to fly one of their virtual aircraft, get a copy of X-Plane at your local software store, then go to http://www.x-plane.com/ and visit their MAPA Flight Sim website (https://commweb.hill.af.mil/lcsim/). There you'll be able to download planes, situations or movies of specific maneuvers.

— 1st Lt. Alan Blanchard , OO-ALC/LCEI

Tinker 'Rocketeer' fires students up about engineering

Aimed at bolstering enthusiasm for the engineering profession, a Tinker Air Force Base, Okla., employee helps pique the interest of students by introducing them to the world of high-powered rockets.

Mr. Stewart Ohler, an aerospace engineer in the C/KC-135 system program office, plans to heighten awareness in his field by teaching rocket classes to educational organizations like the Boy Scouts, as well as students in home schools, public high schools, technical institutions and junior colleges.

"The complexity of the course will be adjusted to fit the age and education level of the students," Mr. Ohler said. He is a member of the Tripoli Rocketry Association, a national organization that helps govern and regulate rocket launches along with the National Association of Rocketry.

Work force shaping

"Tinker and the entire public sector are suffering from a lack of engineers and technical personnel," he said. "Tinker installation commander Maj. Gen. Charles Johnson II has announced a work force shaping effort to try and get programs offered in the schools and, hopefully, shape the work force of tomorrow. I'm just trying to get out and do my part."

Mr. Ohler recently taught his first rocket class to 20 students at Moore High School in south Oklahoma City. The class centered on high school physics and consisted of 10 hours of classroom instruction and 10 hours of hands-on construction.

"I also sold Tinker as a potential career opportunity," he said.

Mr. Ohler said the goals for teaching the class are to encourage high school juniors and seniors to pursue career fields in electrical, aerospace and mechanical engineering, solve a problem using mathematics and physics as a solution to rocketry analysis, and encourage junior membership in local science projects.

At the end of the course, students should be able to design, build, launch and fly a rocket safely.

Mr. Stewart Ohler, C/KC-135 System Program Office at Tinker Air Force Base, Okla., enjoys building and launching his own rockets and uses rockets to introduce science and engineering career fields to students. (Photo by Ms. Margo Wright)

"This class I'm teaching kind of evolved from me getting back into rockets like I was in the '60s," he said. "Today, I'm into the more high-powered rockets, which are made of a thicker material and use a larger amount of fuel to burn."

The students in his first class were divided into four groups and competed in a rocket design and flight competition.

Each team received points for the highest altitude achieved, closest landing to the launch pad, lowest difference between actual and predicted altitude, re-flyable condition of the rocket and report presentation.

They're powerful

Mr. Ohler said the high-powered model rockets are "a little larger and a bit more powerful than the toy Estes brand found in most hobby stores.

The rockets are constructed of paper, wood and plastic and weigh less than one pound. The motor uses less than 125 grams of propellant, which means the flights do not have to be governed by Federal Aviation Administration or any other formal safety regulations.

"The original intent for the project was to conduct this as a competition between schools," Mr. Ohler said. "There was quite a bit of interest, but we could not get all the schools we contacted a sponsor and arrange a consensus for a competition date. Hopefully, next year will be bigger and better. I think the school was quite impressed and I have already been invited to come back."

The demand is there

Mr. Ohler said experts are predicting a surplus of aerospace engineers over the next few years, but he believes they're counting on a complete downturn in military spending.

"The problem with the aerospace industry in general is that it is real spiky," he said. "When there are lots of contracts, there is a big demand and vice versa. But, judging by the way things have gone in the past few years, there is a real shortage."

For Mr. Ohler, becoming an engineer is something he always wanted to do. He said he became interested in rockets as a child watching Americans land on the moon.

"The shortage and the need for people is what I envision and you're not going to get people unless you can inspire some interest," he said.

"Rockets are something casual you can explore without a lot of knowledge, although there is a lot of science and technology involved in them," he said.

"What I'm trying to do is bring that science and technology to the students and get them excited about it," he said. "It gives them a feeling of awe, or a feeling you get whenever you experience something for the first time. Hopefully, that will carry over into college."

— Mr. Darren Heusel, OC-ALC Public Affairs

Hill engineers simulate flight in grounded F-16

Engineers help F-16 Fighting Falcon pilots complete their mission by supporting F-16 software for the Air Force Guard and Reserve at Hill Air Force Base, Utah, Technology and Industrial Support Directorate's Software Engineering Division.

Mr. Randy Hill, deputy chief of the software engineering division, is one of the individuals responsible for improving the F-16 Block 30 aircraft and operational software. The directorate supports more than 600 aircraft.

One of the most recent software advancements — the Litening II Pod — is drawing a lot of positive attention from pilots and field commanders.

They needed help

Last year Defense Department officials informed Air National Guard and Air Force Reserve units that they lacked certain precision attack capabilities, and would not be included in future deployments until aircraft were better equipped to support a warfighting theater using precision guided munitions.

Due to the efforts of Hill engineers, this summer when planes from the 419th Fighter Squadron flew over Iraq as part of Operation Northern Watch, they added that capability with the Litening II.

Smart weapons

Mr. Norm Holmes, F-16 systems engineer, said now that Reservists and Guardsmen are part of the total force concept, there were concentrated efforts to add a precision attack capability to include laser guided bombs and smart weapons.

Along with a precision attack capability, Mr. Bret Heilmann, F-16 systems engineer, notes the addition of a situation awareness capability in the Block 30 aircraft that gives Guard and Reserve units new tools for future deployments and a positive notoriety in an operational environment.

Once the Litening II, which has been used by several foreign air forces, was purchased, engineers modified the software using a low altitude navigation and targeting infrared for night pod interface, or LANTIRN, — used on the F-16 Block 40 Aircraft to perform Litening functions.

Mr. Holmes said the LANTIRN has been around for 15 years, so the upgrade was a welcome change.

Unique challenges

However, modifying the Litening to work with current technology didn't come without its own unique challenges. Due to time constraints, Guard and Reserve units needed the Litening to interface with the current software capability upgrade technologies.

Including some of these capabilities meant re-hosting the targeting pod software into the F-16 operational flight programs. This required scrubbing existing code to make room for the pod software because the computer's memory was already at its limit.

A tight fit

Mr. Holmes describes squeezing technology into existing space as a monumental feat.

To recapture computer memory and optimize space, current code was reengineered. The effort involved sorting through thousands of lines of code. Mr. Hill notes it was like fitting a size 10 foot into a size 9 shoe, requiring ingenious thinking.

Additional improvements were incorporated so the F-16 can distinguish whether the LANTIRN or Litening pod is mounted on the aircraft to account for different field-of view sizes. This allows pilots to use the zoom feature.

Adding capability

"With the Litening targeting pod we were able to add a capability to the older block 30 that actually made it more effective at picking out targets than the newer block 40s," Mr. Hill said.

"With this new capability, pilots are able to pick out anti-aircraft sites that had been a problem for Northern Watch using a high resolution video capability that the video camera in Litening II provides," he added.

It has advantages

The Litening II has several advantages over its predecessor the LANTIRN, including that high-resolution charged-coupled device camera.

"The LANTIRN only has infrared, whereas the Litening II has infrared plus the high resolution. It gives pilots a really nice high, clear picture

with a zoom capability," Mr. Holmes said, "The technology is like looking in a telescope through the end of a soda straw."

Loaning assets

A Litening II pod from the 419th and LANTIRN from the 388th LANTIRN shop were loaned to the integrated test facility to unearth design problems and software glitches before the operational flight programs were released for flight test. Mr. Holmes said the 388th and 419th Fighter Squadrons have been very gracious in loaning assets for testing.

Earning kudos

At a weapons and tactics conference held in Tucson last October, Mr. Holmes said the Litening II was a hit and pilots complimented Hill's role. Conference-goers were especially enthusiastic about the new pilot vehicle interface for the Litening II that will be released in a software capability upgrade.

Hill built seven F-16 simulator stands at a cost of $52 million. A half dozen technicians upgraded cables and modified simulators to provide an interface with the new equipment, as well as designed test stands based on aircraft configurations or new weapons. The stands can test every weapon used by the F-16 and some electronic counter measures systems.

"Obviously, we can't do the dynamics of flight because we're not moving but everything else is exactly the same," Mr. Uplinger said of these targeting pods. He noted that when Edwards AFB, Calif. conducts flight tests, they use software built at Hill and run through flight cards that reflect procedures developed here.

The targeting pod is "pointed" towards a north-facing window. Engineers can track everything from aircraft flying north of the building and vehicles traveling along base roads to trees on Ben Lomond's peak north of Ogden. Mr. Holmes said the narrow field of view and zoom capabilities even allows engineers to pick out individual pine trees on the mountain.

Specific local landmarks within the window's view are helpful in determining the pod's accuracy.

"We use landmarks as 'simulated targets' because we know the longitude and latitude of every one of them. So for comparison purposes, sometimes they'll take the targeting pod and we'll track one of these items and the tracking data from each sensor to see if it is used properly by the aircraft's avionic systems to support weapon delivery or navigation.

"We're verifying that — depending on which one you're testing — either the targeting pod or radar is accurate," Mr. Uplinger said.

About 13 engineers are certified to "fly" the equipment. The number of engineers crowding the test area depends on development of new software or if engineers find a problem during a flight test. Usually two people are at each station. One does the "flying" and the other overlooks to ensure procedures are followed correctly.

Duplicating problems

Mr. Uplinger said when problems are found in flight test, engineers set up test stands to duplicate the problems, so they can verify it and investigate possible causes that can lead to a solution.

And engineers will continue to test the pod, making improvements to aid the Guard and Reservists' participation in the total force concept.

— Ms. Mary Galbraith, OO-ALC Public Affairs

Space shield idea developed at Wright-Patterson

When Mr. Charles Valley, environmental scientist at Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio, learned that Defense Secretary Donald Rumsfeld unveiled a major reorganization of the nation's space program aimed at protecting U.S. satellites from enemy attack, he pondered the possibilities for gearing his invention to space defense.

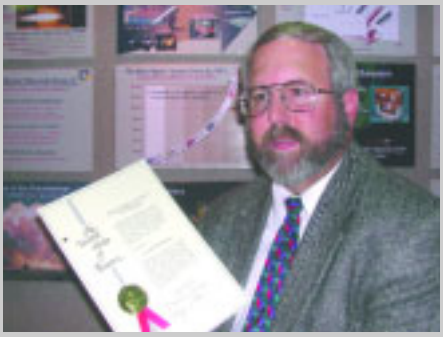
The invention is titled Liquid Crystal Coverslides for Solar Cells. It earned Mr. Valley a scientific patent in 1991, following his research and development work in photovoltaics in the Air Force Research Laboratory during the early years of the space defense initiative of the Reagan Era. Photovoltaics is the conversion of light energy into electrical energy.

Mr. Valley describes his solar shield invention as an electrically switched optical shield for both protecting and concealing solar cells and solar arrays. A conventional construction of an emulsion of encapsulated liquid crystal droplets is sandwiched between two pieces of polyester or silica to form a coverslide, which is in turn attached as a cover to a solar cell or solar cell array.

The coverslide is normally transparent allowing the useable spectrum of light to be fully absorbed into the solar cell junctions for powering satellite systems and protecting the solar cell array from damaging ultraviolet or laser irradiation.

When in "threat mode," liquid crystal coverslides can be remotely switched from transparent to an opaque non-reflective mode that conceals the array from visible detection.

Yet in this mode, a usable amount of light energy can be absorbed and converted for electrical energy for recharging satellite battery systems or providing accessory power.



Mr. Charles Valley holding the patent for liquid crystal coverslides for solar cells. (Photo by Estella Holmes)

"With the reorganizing of America's defense and intelligence space program under the Air Force, it seems an opportune time to revisit an Air Force invention that may play a critical role in future space defense," Mr. Valley said.

Mr. Valley hopes that his discussions with officials at the National Reconnaissance Office and U.S. Space Command will lead to further evaluation and ultimately Defense Department funding to advance the space shield which is designed to protect our satellites from enemy attack.

— Ms. Larine Barr, ASC Public Affairs

AFRL sets fire suppression speed record

Personnel at the Air Force Research Laboratory aren't taking any heat about failing to develop research projects that save lives and prevent property damage. In fact, the materials and manufacturing directorate's fire research group, Tyndall Air Force Base, Fla., developed the world's fastest fire suppression device.

The technology will protect workers and reduce environmental discharges of water saturated with munitions material. The secret of the advanced fire protection deluge system, is its ability to detect a fire within just a few milliseconds, and provide water before the fire gains momentum.

Mr. Steven Wells, a project engineer, provided a preview at the recent American Institute of Chemical Engineers annual meeting. It will extinguish highly explosive or burning materials at speeds near twenty thousandths of a second.

Hazardous, flammable and explosive materials pose a significant risk in military plants that deal with munitions.

Cost of false alarms

The facilities encounter problems with false alarms, because ultraviolet detector-driven suppression systems react to other stimulus in the area. False activations dump thousands of gallons of munitions-contaminated water and lead to environmental nightmares, Mr. Wells said.

"Each time a facility experienced a false alarm 'dump,' the depot lost production man-hours while technicians cleaned up," he said. "When AFRL was asked by the U.S. Army Operations Support Command to help determine what was causing the false alarm problem, we discovered that the suppression systems in use were much slower than needed to extinguish accidental, quickly-burning fires associated with component materials in today's munitions."

With the Army's approval, AFRL built a prototype system and started formal testing in January 1996. To date, more than 200 burn tests have been accomplished.

"When we combined two different detectors from different manufacturers it enhanced the system's ability to monitor and protect a single location," Mr. Wells said. "We have some materials that will start to burn slowly and get to a point where they go 'boom;' in this case we'd need a detector that sees that slow burn. In other cases, when we push the button that ignites that same material, it goes 'boom' immediately. In that case we want a detector that picks up and reacts to the rapid propagation."

The detectors had proven themselves for speed and immunity to false alarms when used in armored personnel carriers and tanks. Additional evaluations proved they would produce a system virtually immune to accidental discharges.

Speed saves lives

The prototype system can be activated within a few milliseconds. When a detector recognizes a burning material, the controller activates a high-rate discharge extinguisher charged with nitrogen and water. A fine mist is discharged, reducing the possibility of fire, explosion, environmental problems and hazardous fume. Follow-on nozzles provide additional cooling.

AFRL scientist Mr. Steven Wells examines the Advanced Fire Protection System. (Courtesy photo)

It's important to get water to the actual burning surface quickly before the fire burrows into material. "In addition, we must get water on personnel in the area immediately to eliminate the heat that could burn their skin," Mr. Wells said.

"The Defense Department standard, which was based on available technology, indicates that water should be present at the nozzle tip in 100 milliseconds," Mr. Wells said. "The fire protection system produces water at the nozzle tip in four to eight milliseconds, more than ten times faster than the current Defense Department standard. The nozzles are placed close to the hazard, so the water travels the short distance to the material in 18 milliseconds."

Search for a solution

Mr. Wells tested several existing components and performed time detection tests on commercially available detectors and controllers.

"When we began testing, we had to evaluate the best components available in the industry and discovered that some of the controllers for existing detectors were too slow for the system we desired," he said. "So we found an efficient controller which, after modifications was compatible with all the detectors evaluated. It has significantly helped increase the speed of the whole system. Our principal goal in this effort was to provide reliability and safety without sacrificing speed. We've accomplished that goal."

Mr. Wells said the new technology has been installed in Picatinny Arsenal in New Jersey and is planned for installation in four other munitions manufacturing and inspection locations.

— Timothy Anderl, AFRL Public Affairs

Science and engineering at forefront of Edwards' environmental efforts

In an environment where the need is ever present to expand the envelope, to move to the right on handling characteristics and push aerodynamic analysis to the edge of space, the science of earth technology is vital.

Earth technology is a combination of hydrology, chemistry, geology and other disciplines that combine within the framework of environmental management. Edwards Air Force Base, Calif., is as much a test bed for earth science disciplines as it is for aeronautics.

Environmental engineers and scientists at Edwards use the leading edge of experimental technology everyday.

Predicting the future

Environmental engineers at Edwards turn to computer modeling and simulation to determine if and how contaminated water is migrating. With even limited geologic field data, a mathematical simulation can be constructed to show how contaminated groundwater is moving.

Mr. Keith Dyas, program manager said some of the things that can be predicted are water flow direction, velocity and well yield.

"The benefit of modeling is the ability to predict the behavior of the groundwater system," he said. "In modeling, we use the same basic mathematical equations that govern fluid flow. We apply those equations to our specific aquifer and learn how our groundwater system is moving."

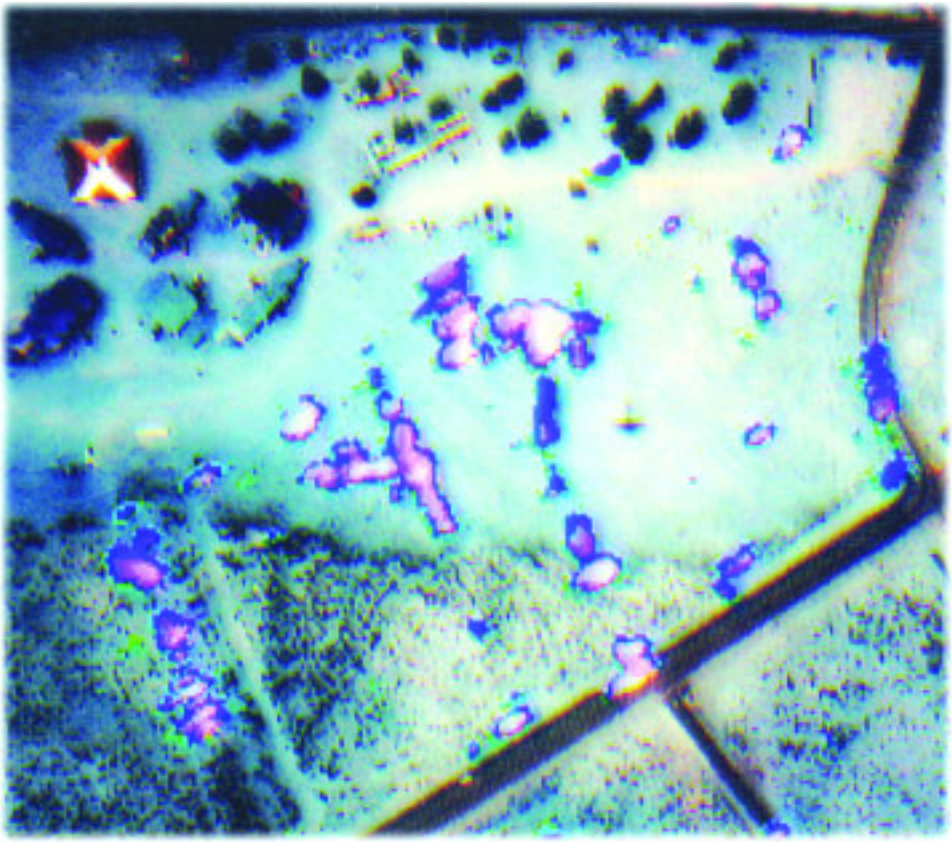
If local geology is clay or sandstone, an engineer or geologist can refer to water transmissivity values for those specific formations. Irregularities can also be built into the groundwater model, such as a fracture or fault.

In addition to determining how the water flows, processes can be built into the model like biodegradation to see how the contaminant concentrations may change.

Through modeling, not only can the movement of contaminated water but what the contamination distribution will look like in 50 or 100 years.

Chemical eating bacteria

Microbiologists and chemical engineers use common bacteria to find and destroy contamination. Bacteria naturally consume chemical compounds in soil, including hazardous wastes. Through modifying bacteria's genetics or changing conditions, bacteria can be made to consume or help break down a variety of chemicals.



Top: Outline of magnetic analytical signal overlaid on a color photograph. The blue and pink areas are metal objects as they appear with magnetic sensor scanning. Right: Earth Radar, an underground imaging technology, investigates an area to determine if chemical warfare material is present. It is capable of detecting metal, glass and plastics as deep as 25 feet. (Courtesy photos)

Bioventing is a technology that uses bacteria naturally living in the ground. Bioventing pumps air below ground. The oxygen in the air energizes the bacteria and they consume fuel contamination.

Cleaning up solvents, however, is a different matter: bacteria don't eat them. But scientists discovered that if they energize bacteria with oxygen and feed them chemicals like toluene or soybean oil they excrete a substance that breaks down solvents into harmless by-products.

Unexploded ordnance, although mostly in remote locations, could have an effect on health and safety for workers and the public. One problem with conventional unexploded ordnance investigation techniques is the false positive, where a piece of scrap metal or an empty casing appears to be a potentially live round. Scientists genetically modified microbes to fluoresce, or grow, under laser light if they have eaten explosives. By spreading the bacteria around a suspect area, scientists can determine if explosives are present.

Through the use of new and sophisticated technology, environmental engineers and scientists address challenges with skill and innovation. Moving ahead of the pack in the true Edwards' spirit.

— Ms. Patty Waterbury and Ms. Pamela Birge, AFFTC/EM

AFRL leads way in research, development

The Air Force Research Laboratory stands 3,139 scientists and engineers strong keeping the Air Force at the forefront of technology by developing and overseeing projects that extend to every engineering and scientific frontier.

Almost half the AFRL scientists and engineers hold a master's degree — 42 percent military, 42 percent civilian; 21 percent military and 28 percent civilian have PhD's.

Leading in electronics

Electrical engineers represent the largest portion of the lab's researchers. Today's military owes its current capabilities to electronics and electrical engineers. Their efforts made modern computers, control systems and high-fidelity sound systems possible.

Ms. Jane Lehr, senior scientist with AFRL's Directed Energy Directorate, High Power Microwave Division, Kirtland Air Force Base, N.M., has spent four years as a government researcher. She has a master and doctorate degree in electrical engineering and plasma physics.

Within two years, her research with pulsed power and electromagnetics surpassed the achievements of the previous 15 years. Her research team developed a portable, high-power radiating system which has military and medical applications. It has received one patent and has another pending.

Out front in training

Mr. Glenn Cicero, a threat systems engineer, is engaged in delivering training solutions as a key member of AFRL's Human Effectiveness Directorate, Warfighter Training Research Division at Mesa Research Site, Ariz. His "Next Generation Threat System" is an electronic combat environment that builds threat models on physics-based tactical operations models. His work continues to garner praise from the war fighter.

AFRL's material needs

Materials engineers make up another segment of engineers within AFRL. They manipulate atomic and molecular structures of substances. They typically work with metals, ceramics, plastics, semiconductor and combination composites to create new materials that meet certain mechanical, electrical or chemical requirements. Their work has lead to the creation of computer chips and television screens.

Ms. Katie Thorp is an engineer with AFRL's Materials and Manufacturing Directorate, Wright-Patterson AFB, Ohio. A typical day for her might involve the use of a nuclear magnetic resonance spectrometer to characterize the degradation of materials used in jet engines. Or she might visit California or Seattle to review a contractor's progress or discuss program issues in a video teleconference.

Mechanical know how

A mechanical engineer at Mesa research site, Mr. Phillip Peppler, leads visual development activities for the warfighter training research division's distributed mission training visual research and development team. Technology focus areas include ultra-high resolution projectors, personal computer-based image generators and display screen materials. The development of ultra-high resolution visuals will meet training requirements for out-the-window visuals in the distributed mission training environment.

Dr. Jane Lehr, a scientist in the Air Force Research Laboratory Directed Energy Directorate High Power Microwave Division, Kirtland AFB, N.M., examines equipment used in the research on pulsed power and electro-magnetics.

According to Mr. Peppler, one goal is to develop a new class of projector technology which will allow out-the-window visual displays to approach what a pilot sees in the real world. It will also open up new military and commercial markets for high-end, high-resolution imagery.

Scientists and technology

Side by side with engineers are scientists exploring frontiers for the Air Force in the development of new technologies. Within AFRL's Munitions Directorate at Eglin AFB, Fla., Mr. Dennis Goldstein, a physicist, has worked for the Air Force for a quarter of a century, 23 of those years with the armament laboratory and the munitions directorate. He has published five patents and more than 50 articles.

He was recently inducted as a fellow by the International Society for Optical Engineering and recognized for his contributions to the fields of polarimetry and optical signal processing.

Infrared technology

Of the scientists with AFRL's Space Vehicles Directorate at Hanscom AFB, Mass., Dr. Stephan Price's research has a profound influence on infrared astronomy. His pioneering and sustained contributions to infrared astronomy, space experimentation and numerical analysis have earned him international recognition.

These are but a few of the scientists and engineers that work on the leading edge of science and technology. At AFRL, they have opportunities to interact with other international experts in government, industry, academia and in world-class laboratories. Their contributions helped take the Air Force from propellers to jet engines, from seat-of-the-pants flying to advanced avionics and human-centered systems. Laboratory developed technologies by AFRL's scientists and engineers make today's F-117, B-2, C-17 and F-22 the world's most advanced military aircraft. They will continue to stack the science and technology deck in support of present and future warfighters.

— Information provided by AFRL Public Affairs

Airlifters capitalize on cargo areas

Thanks to efforts of the men and women of the Air Force Flight Test Center at Edwards Air Force Base, Calif., warriors assigned to Air Combat Command's Air Expeditionary Forces may soon have a new tool for deploying in a more efficient and cost-effective manner.

A unique research and development project to design, build and test a new bi-level airlift loading system was recently conducted at Edwards.

The system has the potential for reducing the number of airlift aircraft required to deploy a fighter wing. The bi-level system will not only free up more cargo aircraft to support other missions. It also has the potential to save millions in deployment costs.

Building up

Air Combat Command typically has two of its ten expeditionary units deployed to different parts of the world at all times. These deployments, based on a regular rotation cycle, equate to relocating hundreds of aircraft and thousands of personnel and pieces of support equipment every 90 days.

During a recent deployment, Master Sgt. Robert Wertz, an aerospace ground equipment specialist assigned to the Air Expeditionary Force Battlelab, Mountain Home AFB, Idaho, observed the C-17 Globemaster III aircraft's available cargo space is slightly more than 41,000 cubic feet.

"Typically, most support equipment and some cargo measure less than 48 inches tall, occupying all the available floor space, but using only about 8,000 cubic feet of space," Sgt. Wertz said.

"This leaves more than 33,000 cubic feet of unused space above the floor," he said.

Sgt. Wertz asked if a bi-level system could be built that would allow cargo to be stacked and loaded into the aircraft bunk-bed style, which would make better use of the cargo space.

A new universal system

He approached the 412th Logistics Group at Edwards about developing, building and testing a bi-level loading system. Teamwork on the part of the two organizations resulted in two, distinct bi-level designs, using the standard 463L cargo pallet.

Some of the new design features include an adjustable height of 48-60 inches, and drive on and off capability supported with interchangeable parts.

Using standard cargo pallets for the basis of the system makes the assembly universal as any type of airlift aircraft can successfully use the new loading system.

Passing the test

Mr. Al Vatcher, a mechanical engineer with the logistics group's instrumentation division, took all the ideas and translated them into comprehensive designs and fabrication drawings.

The fabrication element division at Edwards built the various components, which were assembled into working models.

Finally, test procedures were developed to apply positive and negative crash load requirements to the bi-level system.

At the conclusion of crash load testing, airdrop specialists evaluated each model for ease of setup and teardown, loading cargo, securing the cargo with tie-down chains and straps and loading the bi-level system onto aircraft.

Test results demonstrated that both models exceed all customer design and crash load requirements.

Four more units will be built and delivered to selected Air Expeditionary Force units for operational test and evaluation.

Up to the challenge

Bottom line — they were challenged to design, build and test a totally new and innovative system that has the potential to dramatically increase warfighting capacity while greatly reducing the logistics footprint and saving many millions of dollars in deployment costs. Team Edwards met the challenge; warriors supporting warriors.

— Mr. Mike Mann, 412th Test Wing Engineering Directorate

Top: Members of the 450th Test Squadron Airdrop Element, Edwards Air Force Base, Calif., demonstrate the bi-level loading ability of the wing's newest logistical tool. Bottom: Mr. Carman McMurray performs a bi-level loading system fit check on a C-130 aircraft. (Courtesy photos)

Senior airman Richard Harrigton, 72nd Security Forces Squadron, leads a defensive fighting position. (Photo by Ms. Margo Wright, OC-ALC)

Exercise helps prepare base for inspection

TINKER AIR FORCE BASE, Okla. — Installation personnel got a head start on next spring's operational readiness inspection by holding the first of six scheduled exercises to test their ability to meet the readiness mission.

War Wagon 01-07, a two-part exercise held recently, was designed to prepare the work force for peacetime and wartime taskings.

The exercise scenario of unrest in Southeast Asia required troops to deploy and the Oklahoma City Air Logistics Center to surge aircraft and accessories.

Base personnel experienced the different threat conditions and information conditions and some participated fully in a field training environment.

The plan was to evaluate the base's ability to mobilize, deploy and employ personnel and resources in support of wartime taskings, defend and recover from hostile actions on the home station and continue necessary operations under increased threat conditions.

Other objectives included evaluating compliance with regulatory policies, operational readiness standards and Air Force instructions and evaluate the exercise management system in preparation for more complex exercises.

Phase I practiced deployment processing and battlestaff activation. Some military personnel actually processed through the mobility processing line. Others, including civil service personnel, began maintaining communications systems and recovering from simulated terrorist attacks and equipment outages.

Phase II had troops deploy to the Glenwood Estates north of the base to practice in an environment that simulates a real-world deployed location.

— Information provided by OC-ALC Public Affairs

Hawaiian students visit Air Force telescope complex

MAUI, Hawaii — Thirty middle school students toured Air Force Research Laboratory telescopes here in August as part of a program that exposes students of native Hawaiian decent to math, science and engineering opportunities on Maui.

Under a program with the Air Force, the Maui Economic Development Board and the Kamehameha schools, the students visited the Maui Space Surveillance Complex of the laboratory's directed energy directorate.

The students learned about latest technologies used in space surveillance as they saw the world's largest telescope capable of capturing images of quickly moving satellites passing overhead. This 3.67-meter telescope and other smaller telescopes are used to image and track objects in space.

The significance of Haleakala in Hawaiian culture was discussed with the students as was Air Force efforts to protect the environment on the mountain.

The visit was hosted by Detachment 15 and Air Force Space Command's Detachment 3. The directed energy directorate is located at Kirtland Air Force Base, N.M.

— Information provided by AFRL Public Affairs

Robins partners with Lockheed on LANTIRN

ROBINS AIR FORCE BASE, Ga. — The Warner Robins Air Logistics Center recently entered into a direct sales partnership with Lockheed Martin Missiles and Fire Control for its low altitude navigational targeting infrared for night system, or LANTIRN

The first of its kind for the center's avionics management directorate, this partnership is only the second in the entire Air Force.

According to the agreement, Avionics Management's Production Division will perform repair of shop replaceable units, deliver reparables directly and receive payment from Lockheed Martin. This is a direct sales agreement similar to a subcontract in the private sector. Benefits include better warfighter support and savings to the customers.

— Information provided by WR-ALC Public Affairs

AFRL accepts delivery of prototype digital camera

ROME, N.Y — The ability to protect copyrighted images in the virtual world has taken a step forward with the delivery of a digital watermarking camera to the Air Force Research Laboratory Information Directorate here.

The camera is the result of the directorate's dual-use science and technology effort with the Eastman Kodak Company, Rochester, and the State University of New York at Binghamton.

Digital images can easily be copied. Although copying may violate copyright and other laws, it is widespread — especially on the Internet.

Watermarking helps eliminate this problem and provides hidden, value-added information.

Secure digital cameras can provide wide-ranging benefits such as verifying image integrity, embedding a photographer's and a camera's signature, automating image dissemination and distribution and enabling covert communication.

— Information provided by AFRL Public Affairs

AFGE president visits Tinker to share concerns

TINKER AIR FORCE BASE, Okla. — The national president of the American Federation of Government Employees shared his thoughts on work force shaping, employee training and blue-collar pay during a recent visit here.

Mr. Bobby Harnage represents most of the approximately 15,500 civilian employees working here and thousands more command-wide. He said one of the most important concerns the Air Force and union need to address is work force shaping, with an estimated 40 percent of federal employees in AFMC eligible for retirement within the next five years.

He praised the Air Force's efforts to further a strong partnership with AFGE. He said benefits AFGE is working on getting include training incentives, higher pay, equal raises for blue and white collar employees and lower insurance premiums. Privatization, or transferring work from the government to a contracted private company, is also a concern for the union and its members.

— Information provided by OC-ALC Public Affairs

C-130 Shop

Integrated lean repair makes debut at Robins

At Robins Air Force Base, Ga., workers looking to find more efficient methods for handling workloads have initiated a new program known as integrated lean repair.

"This program is an initiative that will apply lean thinking to maintenance, repair and overhaul at Robins," said Maj. Gen. Dennis Haines, Warner Robins Air Logistics Center commander.

According to officials in depot re-engineering where the initiative originated, integrated lean repair will reduce cycle time, improve schedule performance and reduce depot and base work-in-process inventories.

Previously, the center used a program of lean methodology that included goal setter buy-in and directed changes, with consultant initiatives. Mr. Jim Jones, depot re-engineering deputy director, said the new lean initiative includes shop worker buy-in and eliminates the consultant initiatives.

"The main difference is that this initiative is top down — bottom up," Mr. Jones said.

"This initiative involves all facets of the work process from top officials to mechanics on the shop floor," he said. Repair programs, financial programs, parts back shops and personnel are targeted. "You can't just look at the repair. You have to look at all of the things that impact the people who make the repairs."

This initiative is making its debut in the C-130 shop. "We have been tasked to reduce the number of flow days by 30 percent," he said.

Workers at Warner Robins Air Logistics Center, Robins Air Force Base, Ga., have come up with a new program to apply lean thinking to maintenance, repair and overhaul on the C-130, a mainstay of the workload at Robins. (Air Force photo)

"It is common knowledge that the C-130 is one of the mainstay workloads at Robins and is scheduled to remain so well into the future. Due to this it's an ideal scenario for lean applications.

"It's a complete effort, not just a repair effort," Mr. Jones said. "This will be a complete re-engineering process for everything involved in the C-130 product directorate.

"Reengineering is quick to reference the optimistic posture and commitment C-130 production division leadership is extending toward implementing integrated lean repair, and considers their attitude a key ingredient in the recipe for a successful repair program," said Mr. George Young, aircraft repair enhancement program team lead.

"We don't have parameters on who we work with because we need to get down to the level where people really know the process," Mr. Jones said. "Those are the ones who will facilitate the changes."

Mr. Young said officially the program is scheduled to begin immediately when the on-going maintenance standardization evaluation program is completed.

— Ms. Lanorris Askew, WR-ALC Public Affairs

U.S., British Navies test Tomahawk at Eglin

Members of the 46th Test Wing at Eglin Air Force Base, Fla., along with British Royal Navy and U.S. Navy experts captured the calm after the storm Aug. 7-8 to successfully flight test two unarmed Tomahawk weapon systems at Eglin.

As the base recouped from Tropical Storm Barry, test teams, in two separate tests, fired Tomahawk land attack missiles from a submerged Royal Navy submarine and a U.S. Navy destroyer in the Gulf of Mexico.

The British attack submarine Trafalgar launched a missile from 200 miles off the coast Aug. 7. The missile flew a preplanned route over Eglin's water and land ranges using the Global Positioning System and digital mapping techniques to a designated target.

The next day, the U.S. Navy followed suit, successfully firing a Tomahawk from the USS Mahan. The missile also flew a land attack mission, made a simulated aerial detonation close above its target, then deployed a parachute and was safely recovered.

The British attack submarine Trafalgar launched a Tomahawk missile from 200 miles off the Gulf Coast to a target at Range B-70, Eglin Air Force Base, Fla., in August. (Title photo: An F-16 Fighting Falcon with the 33rd Fighter Wing serves as a chase aircraft during successful U.S. and British Navy Tomahawk tests at Eglin recently. Pilots in the chase aircraft ensure that the inert missile stays on target.)(Courtesy photos)

According to Mr. Raymond Sears, 46th Operations Group program engineer for Tomahawk support, test wing officials provided planes and pilots to chase the missiles, ensuring safe separation though air traffic control, provided weather forecasting and observation support and collected data using radars and high-speed tracking cameras for the U.S. Navy and the British.

"The test used a broad spectrum of Eglin resources," Mr. Sears said. "All of the assets we provided were critical to the success of the test." Both missiles flew approximately 45 minutes and covered more than 500 miles at altitudes varying between 1,000 and 100 feet before coming to a rest.

Shortly after launch, the missiles transitioned to cruise flight and were accompanied by specially modified F-15 and F-16 chase aircraft from the 40th Flight Test Squadron. The aircraft are equipped with a remote command and control and flight termination system that allows the aircrew to take remote control of the missile.

Maj. Steve Gurney, an F-16 and A-10 test pilot with the 40th Flight Test Squadron, was the Tomahawk's lead chase pilot and served as the focal point for the Navy for information concerning aircraft capabilities and local flying procedures. As the Tomahawk chase lead, he had to decide whether or not to launch the missile based on current weather conditions.

"Sometimes the decision to call off or delay a test due to weather is difficult, knowing they may have to terminate an expensive missile and waste not only that but the money required to put six to 12 aircraft in the air," Maj. Gurney said.

Even with the onslaught of Tropical Storm Barry that brought torrential rain to the Florida Panhandle, weather didn't impede the test. The Trafalgar had, ironically, followed the storm into the Gulf, but the crew never saw it, said Royal Navy Capt. John Kirkpatrick, the United Kingdom Tomahawk program manager.

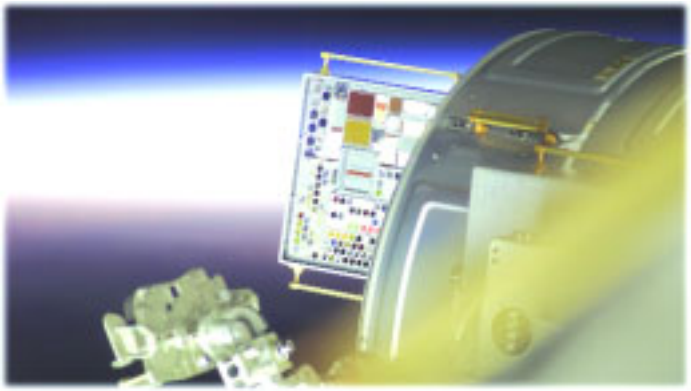
Capt. Kirkpatrick credits Eglin's hard work preparing for the launch, despite the tropical storm. "The support we've had here has been exceptional," he said. "They really turned it on after the storm and made sure the test got off on time."

"The Tomahawk is a very difficult and high visibility test which showcases team Eglin's flexibility and professionalism," Maj. Gurney said. "The fact that another branch of service knows it can come to Eglin and get the job done right every time has a favorable impact on our image as a top-notch test facility."

Future plans call for both the U.S. Navy and the Royal British Navy to conduct more Tomahawk tests at Eglin.

— Tech. Sgt. David Donato, AAC Public Affairs

Project M-ISS-E: AF researchers "birth" new materials for space



When the Space Shuttle took off from the Kennedy Space Center at Cape Canaveral, Fla., recently it carried more than astronauts into space.

Strapped onboard in the payload bay were two suitcased-sized components carrying the hopes and dreams of researchers in the materials and manufacturing directorate of the Air Force Research Laboratory, as well as students from several area schools, according to Mr. Stephan Wolanczyk, a materials engineer at the Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio.

Principal investigator in the lab's materials and manufacturing directorate, Mr. Wolanczyk recalled the 1999 origin of the effort, now dubbed "Project Materials on International Space Station Experiment or M-ISS-E."

In the beginning

"It all started with Mr. Gary Waggoner, our then division chief in the system support division, who always had an interest in space and helping our directorate move in that direction," Mr. Wolanczyk said. He got approval to generate what became a consortium of the prime space contractors in the United States, dubbing it S3AE — short for Space Systems Support Affordability Effort."

The initial effort involved the materials directorate and the five U.S. major spacecraft manufacturers — Boeing, TRW, Space Systems Loral, Hughes (now owned by Boeing), and Lockheed, he said.

"Our goal was to collaborate on space-based projects that would benefit the members equally, that we could fund on a cost-sharing basis," Mr. Wolanczyk said. "S3AE got all the major players in the space community to work together on developing technologies — like electron beam curing of composite materials, for example — that no single agency might have dared to work on alone, because they were perhaps too risky, not cost-effective or too minor to explore, but still valuable, in terms of advancing materials research."

Serendipity struck when one of the team-members, Mr. Gary Pippin of Boeing, realized the potential for increased materials research through an S3AE-NASA partnership that would involve the international space station. He had worked with the National Aeronautics and Space Administration's Passive Optical Sample Assembly I and II experiments on the Russian MIR spacecraft.

"We proposed that AFRL's Materials and Manufacturing Directorate put Boeing on contract to design and integrate all the materials samples the S3AE consortium and NASA wanted to characterize for possible use on future spacecraft," Mr. Wolanczyk said. "Once Dr. Charles Browning, our director, approved the idea, Project M-ISS-E was born."

According to Mr. Wolanczyk, some 1,781 materials samples — mostly discs one inch in diameter installed on the same four passive experiment carriers that flew on MIR — flew on the exterior of the space station, one facing the sun, one facing away, so they experience different degrees of solar radiation and atomic oxygen degradation. Two of the carriers contain 908 samples, of which 171 are the directorate's, that will fly from 2001-2002. The second set, containing 873 samples, will carry 90 directorate samples and fly from 2002-2005.

Passive experiment carrier samples vary from optical coatings to thin-film polymers, from solar cells to inflatable structural materials, Mr. Wolanczyk said.

"There are micro-electrical mechanical system devices, electro-optical switches, composites, Kevlar and carbon foams, and multi-layer insulation materials. Also included are thermal control coatings (flight paint), including ceramic-based samples, and radiation-shielding materials," he said.

The samples are small enough to allow for a wide range of materials to be included, but large enough to be analyzed by each of the partners following the flights, he said.

Comparing data

"Our goal is to find out how each of these samples performs in a real space environment – how long it lasts, how it degrades, how its properties change over time," he said. "We'll compare what we find in our respective labs with pre-flight, ground test data in simulated space environments, and feed those results into a shared database, to help all of us make better materials choices for future spacecraft designs and related applications."

A secondary, but related effort on Project M-ISS-E, is a series of 27 experiments by Ohio and Kentucky schoolchildren, in grades one through 10, that were carried underneath the materials experiments to stimulate the youngsters' interest in space science, Mr. Wolanczyk said.

"We've got 14 schools sending 11 experiments on the first set of carriers, and 16 on the second set," he said. "These are things like processed and unprocessed foods – flour, sugar and rice – plus some seeds and a semiconductor laser. There's even a retrovirus that will be flown to see if space alters its ability to reproduce, much like the AIDS virus."

The project also flew seeds of the purple coneflower — state flower of Ohio — and native prairie grass that will be distributed to those schools that were not able to send an experiment to space, he added. "And in 2003, our chief scientist, Dr. Wade Adams, will scatter some of those same seeds on the soil of Huffman Prairie, to commemorate the 100th anniversary of first manned, powered flight by Orville and Wilbur Wright."

— Ms. Sue Baker, ASC Public Affairs

ARIA makes final touchdown

The drooping nose of the EC-18B Advanced Range Instrumentation Aircraft, or ARIA, hung a little lower as its impressive career drew to a close on touchdown at Edwards Air Force Base, Calif., recently.

Both EC-18Bs assigned to Edwards are slated to go to the Air Force's Joint STARS program by September. Joint STARS, the E-8C Joint Surveillance Target Attack Radar System, an airborne battle management, command and control platform provides dedicated support of ground commanders requirements.

For the past 30 years, the EC-18B Advanced Range Instrumentation Aircraft has been recording and relaying telemetry from space vehicles such as the space shuttle and ballistic missiles. The ARIA program came to a close recently as the aircraft touched down after its final mission. The aircraft is slated to go to the Joint STARS program in September. (Courtesy photo)

It's a bird...

ARIA's sagging and misshapen nose earned it the nicknames "Droop Snoot" and "Snoopy Nose." The bird's bulbous beak is a 10-foot radome housing a 7-foot steerable dish antenna.

Originally named the Apollo Range Instrumentation Aircraft, the ARIA program was developed by NASA and the Defense Department in the 1960s to track lunar missions, along with unmanned orbital and ballistic re-entry programs. The first of eight, then EC-135N, aircraft became operational in 1968 as the program stood up at Patrick AFB, Fla.

Seven years later, ARIA, redesignated as Advanced Range Instrumentation Aircraft, transferred to the 4950th Test Wing at Wright-Patterson AFB, Ohio. In 1994 the ARIA program, which now included EC-18B aircraft and more than 200 airmen, relocated to Edwards. Gradually, taskings dwindled and planes were declared excess and transferred to other programs including Joint STARS.

The costs associated with maintaining the aircraft and its capability became a major factor in ending the ARIA program.

A difficult choice

"We had to make a hard decision," said Brig. Gen. Perry Lamy, former 412th Test Wing commander at Edwards who is now serving as the director of operations at Air Force Materiel Command headquarters at Wright-Patterson. "We must continually balance accomplishing the mission with good stewardship of our resources. Continuing in the situation we faced would have made us poor stewards of taxpayer dollars."

The transfer of the last two operational aircraft to Joint STARS is a bittersweet event for the Edwards-based ARIA crew.

"In many ways, the final flight gives us closure on a mission that has been fading over the last two years," said 1st Lt. Gus Jordt, from the 418th Flight Test Squadron who was the mission commander for the last two flights. "However, it is sad to see such a great mission, a great aircraft and great capability all go away."

Operational customers from the 49th Test and Evaluation Squadron at Barksdale AFB, La., accompanied the ARIA team on several of its final missions, which involved the testing of advanced cruise missiles. The Barksdale crew will soon rely on the Big Crow, an NKC-135B from Kirtland AFB, N.M., to carry on its mission of testing of both nuclear and conventional advanced cruise missiles.

Up to the task

The final ARIA team was an integral part of ensuring its replacement is up to the task.

"We can't fly our missiles without the airborne telemetry platform provided by the ARIA," said Capt. Rob Neher, airborne lead engineer from Barksdale. "With the demise of the aircraft, the ARIA crew has worked with us and with Kirtland to give us confidence that the transfer of our testing will be successful."

The crew has overcome numerous challenges in completing its final missions, said Capt. Aaron Almendinger, chief of ARIA technical operations.

It wasn't easy

"Over the past two years it has become more difficult to maintain and upgrade our equipment and we have continued to lose experienced people," Capt. Almendinger said. "It has been tough to keep up a good product, but the crew has done it and made it look easy."

Without the support of the operators, ARIA would not have enjoyed the success it has, he said.

"If you take away their expert knowledge and experience, the capability is not here," Capt. Almendinger said.

Fans of the sole remaining EC-135E ARIA, nicknamed "Bird of Prey" can find it at the United States Air Force Museum at Wright-Patterson.

— Ms. Leigh Anne Bierstine, AFFTC Public Affairs

Tom Clancy thriller launches NCO's "Hollywood career"

Some people may presume he already possesses a "glowing" personality as superintendent of the Air Force Radiation Assessment Team. But to his collegues, Master Sgt. Dave Martin is now known as "Mr. Hollywood."

A 36-year-old Canadian-born bioenvironmental engineer at Brooks Air Force Base, Texas, he recently returned to his native Canada serving as a military consultant to the motion picture "*The Sum of All Fears*." He spent four days in Montreal, where most of the movie was filmed, doing dialogue coaching, radiation assessment equipment training and military grooming support.

"The movie is based on the Tom Clancy book that was a best seller in the early 1990s," said Sgt. Martin. "The story involves terrorists who detonate a nuclear weapon over the Super Bowl in Baltimore."

Based on experience

Col. Sherrell Russell, surveillance directorate director, selected Sgt. Martin for the movie mission based on his 18 years of Air Force experience.

His Hollywood adventure began when Air Force Public Affairs contacted the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis to provide the production crew an Air Force Radiation Assessment Team expert as technical consultant. The Air Force supported the film to make sure moviemakers accurately portrayed the team.

"Of the many military 'experts' from various branches of the military services providing technical expertise to the movie, Sgt. Dave Martin's was by far the most critical," said Mr. Chuck Davis, Defense Department project officer for the film. "Exceptionally knowledgeable in the radiation assessment mission, his valuable contributions added greatly to the movie's credibility and realism."

Sgt. Martin said the production crew and actors appreciated his contributions. "They listened to some of the suggestions I made. A lot of it had to do with how team members interact."

He showed them how to take dosimetry readings and how to properly wear radiation suits. He also adjusted to some of the props that were used. "They used a radiac meter, something we would not use," he said. "However, I showed the actors how to use it."

There were differences

He said he was also shocked by another prop. "The Air Force Radiation Assessment Team tent looked nothing like what we have, but I learned it had been modified for lighting the set," he said.

Master Sgt. Dave Martin demonstrates an Air Force Radiation Assessment Team personal protection suit. (Photo by Staff Sgt. Sabrina Johnson)

He also made sure actors portraying team members were properly groomed with military haircuts and correctly displayed Air Force patches and insignia. The prop people also duplicated the official team identification badge, something they had not included in the actors' military ensemble until they saw Sgt. Martin wearing it.

More importantly, Sgt. Martin helped correct some lines in the script involving team lingo. "I helped change several lines for technical accuracy," he said. "Before I made changes, I called Brooks for guidance from several team members."

It wasn't work as "usual"

Sgt. Martin said he was impressed by the film crew's professionalism, although work on a movie set did not follow a routine "9 to 5" day.

Some of the unexpected perks he enjoyed involved the red carpet Hollywood treatment. "They picked me up at the airport in a limo and I had first class hotel accommodations," he said, noting that the Air Force agreed to him serving as a consultant based on "no cost to the government."

Sgt. Martin worked mainly with supporting actors and extras and with director Mr. Phil Alden Robinson, who earned an Academy Award nomination for best screenplay adaptation for the 1989 film "*Field of Dreams*" that he also directed. He also met the film's star, Mr. Ben Affleck who played Jack Ryan.

Born on Canada's Prince Edward Island, Sgt. Martin enjoyed working in Quebec.

"Montreal was selected for the film because of its architecture. It looks like a European city," he said. "Parts of it also look like an American city."

His arrival there marked the end of the film's shooting. "They've completed filming and now are editing it," he said. "The movie costs $80 million to make, plus $30 million to promote."

A release date has not been announced.

While he was there, a staff producer interviewed Sgt. Martin on camera as part of a "how they made the movie" trailer that may air on television.

"I'll never watch a movie the same way again," he said. "When you see an extreme close-up, there are about 60 technical people in the background."

As for his "once in a lifetime Hollywood opportunity," Sgt. Martin said he believes his participation has given the real team and the Air Force appropriate recognition for their contributions to national defense.

— Mr. Rudy Purificato, 311th HSW

A tale of two brothers, one squadron

Ask for Senior Airman DeOrio at the 75th Security Forces Squadron at Hill Air Force Base, Utah, and things could get confusing.

As a matter of fact, you'll have to be more specific because DeOrio brothers Jason and Matt are assigned to the same squadron.

Working different flights and wearing different ranks has kept squadron confusion down to only a few roll call mishaps so far. However, things got more complicated recently when Airman 1st Class Matt DeOrio sewed on the same rank as his brother, Senior Airman Jason DeOrio.

Differences

At 22 Jason is older, but 20-year-old Matt has more security forces experience. Matt has also spent more time at Hill — a year and a half versus Jason's six months. "When I got here everybody kept asking, 'Did you know there's another DeOrio in the squadron?'" Jason said of his first week.

Both entered the Air Force when they were 18 years old. Their parents, Mr. and Mrs. Jack DeOrio, said they were influenced by positive experiences in their high school ROTC program — a program their 16-year-old sister Rachel is now enrolled in.

Jason spent the first three and one-half years of his Air Force career working with F-15s before cross training into security forces. Matt has always been in the security forces career field.

Matt enjoys patrolling the base and the physical activity that accompanies the security forces duties. Jason also likes the physical activity and being outside.

"I couldn't do an office job," Jason said.

Senior Airman Jason DeOrio and his brother, Senior Airman Matt DeOrio are both assigned to the 75th Security Forces Squadron at Hill Air Force Base, Utah.

Teammates

While the brothers spend most working days on different shifts — Matt finishes work at 6 a.m. just as Jason begins — they're Defender Challenge teammates.

First Lt. Barry Burton, flight commander, said on the obstacle course the brothers bring out the best in each other because neither wants to lose to the other. He said once competition is over, it's a different story.

"I've worked with them both and they like challenging each other, but they're still best friends," he said. "That's an uncommon thing to see among brothers."

Outside work, the DeOrios play basketball, lift weights and "hang out." Jason said things get pretty heated when they're competing on the court, and a few of those arguments turn into wrestling matches. But for the most part, they get along.

And roommates...

They'll be hanging out a lot more when they rent an apartment off base with another security forces friend soon. Matt said they may fight more than typical roommates, but Jason said there's also a lot more trust when you live with family.

Jason and Matt estimate they'll spend the next two years at Hill. Jason recently extended for two years and Matt has two years left on his enlistment.

Life in the Rocky Mountains is different than life on the East Coast for the DeOrios who're from a Philadelphia suburb.

"When I got here I felt like somebody was standing on my chest for awhile because I've always been at sea level," Jason said.

But the two have adapted — in fact Matt competed in the base triathlon recently.

A family affair

Their mom said she's happy the brothers are stationed together. She added although the Philadelphia-based DeOrios haven't been to Utah yet, they're planning to travel out west next spring or early summer and Rachel is looking forward to seeing her brothers and camping in Utah's mountains.

It won't be the first time Mr. and Mrs. DeOrios have logged miles to visit their sons. Last summer the couple packed up the family car to watch Matt compete in the Defender Challenge at Eglin AFB, Fla.

Matt was the youngest competitor. His mom said he got some ribbing from the other guys because she was on the sidelines.

"He said 'stand over there mom,' because I was too close and the guys were telling him to have his mom write him a note," she said chuckling. "I told him we drove 20 hours to visit that boy. Don't tell me to get back!"

Regular phone calls — at least two or three a week — keep the family close. "They call us all the time so we never have to worry about how they're doing," Mrs. DeOrio said. "We keep connected as a family and talk.

The couple said although they'd like to have the brothers stationed closer to home, they don't worry too much because they know Jason and Matt are making good decisions.

"Both of them have a good work ethic and did a good job in school," Mrs. DeOrio said. "We never had to watch over their shoulder. They're just good boys and we love them very much — and we aren't prejudiced at all."

— Ms. Mary Galbraith, OC-ALC Public Affairs

Bugler calls making that "final call" highest honor

For a lot of families, "Taps" is the final call.

"That's usually when the family becomes emotional," said Senior Airman Elisabeth Applegate.

She should know. She's an Air National Guard security forces member serving on active duty as a bugler in the honor guard at Wright-Patterson Air Force Base, Ohio. She's taken part in numerous military funerals since arriving in June.

Serving with honor

An accomplished musician who's played with two major university bands, Senior Airman Applegate said her desire to serve with the honor guard comes from having a "strong military family."

"My seven uncles and father served and my grandfather was in the Navy in World War II," she said. "I'm the first female in my family to serve and only the second Air Force person."

As she dons her Air Force blues and shines her bugle to play that "final call," she's very aware of the solemnity and importance of her task.

One of her cousins was killed in the Gulf War and she attended the ceremony.

It's important

"I've seen funerals from both sides," she said. "I know how important they are."

A member of the Air National Guard since September 1999, she has played trumpet in bands since she was in the third grade.

In college, she was a member of the Ohio State marching band.

"I was in the band at Eastern Michigan," she said. "Ohio State came up here for a football game, I saw their band and I transferred there the next quarter."

She's now part of the university's 800-member alumni band.

Although an experienced horn player, she said, "It's very hard to play a bugle. There are no valves and it takes more air to play it."

She said she began playing bugle in basic training where she sounded "Retreat" and "To The Colors" at the end of the day. "The day I graduated, I played in three ceremonies," she said.

Consistency

Since January 2000, Air Force honor guard ceremonies have been standardized. Senior Airman Applegate said the active-duty honor guard trains the Air National Guard and Air Force Reserve honor guards so that everything is consistent.

As soon as she was properly trained, she talked to Master Sgt. Homer Carter, honor guard air reserve technician program manager, about an opportunity to put that training to use.

"I finished school at Ohio State on June 4 and joined the honor guard the next day," she said.

In the grand scheme of the honor guard team, the bugler occupies a special place, she said. "I feel added pressure when the spotlight is on," she said. "But it's not going to stop me. I feel good about this.

"You do it because you want to. The biggest reward is when the family tells you how much they appreciated you," she said.

Senior Airman Elisabeth Applegate, a bugler with the Honor Guard at Wright-Patterson Air Force Base, Ohio, plays "Taps" honoring a fallen service member. She is an Air National Guard member serving on active duty at Wright-Patterson for the Summer. (Photo by Mr. Spencer Lane, WPAFB Public Affairs)

"It's knowing that you've done someone a service. I just can't put into words how proud my mother and father are of me," she said.

A special request

"My whole family has requested that I play Taps at their funerals. It's a very honorable feeling to be part of a funeral for someone who served before us."

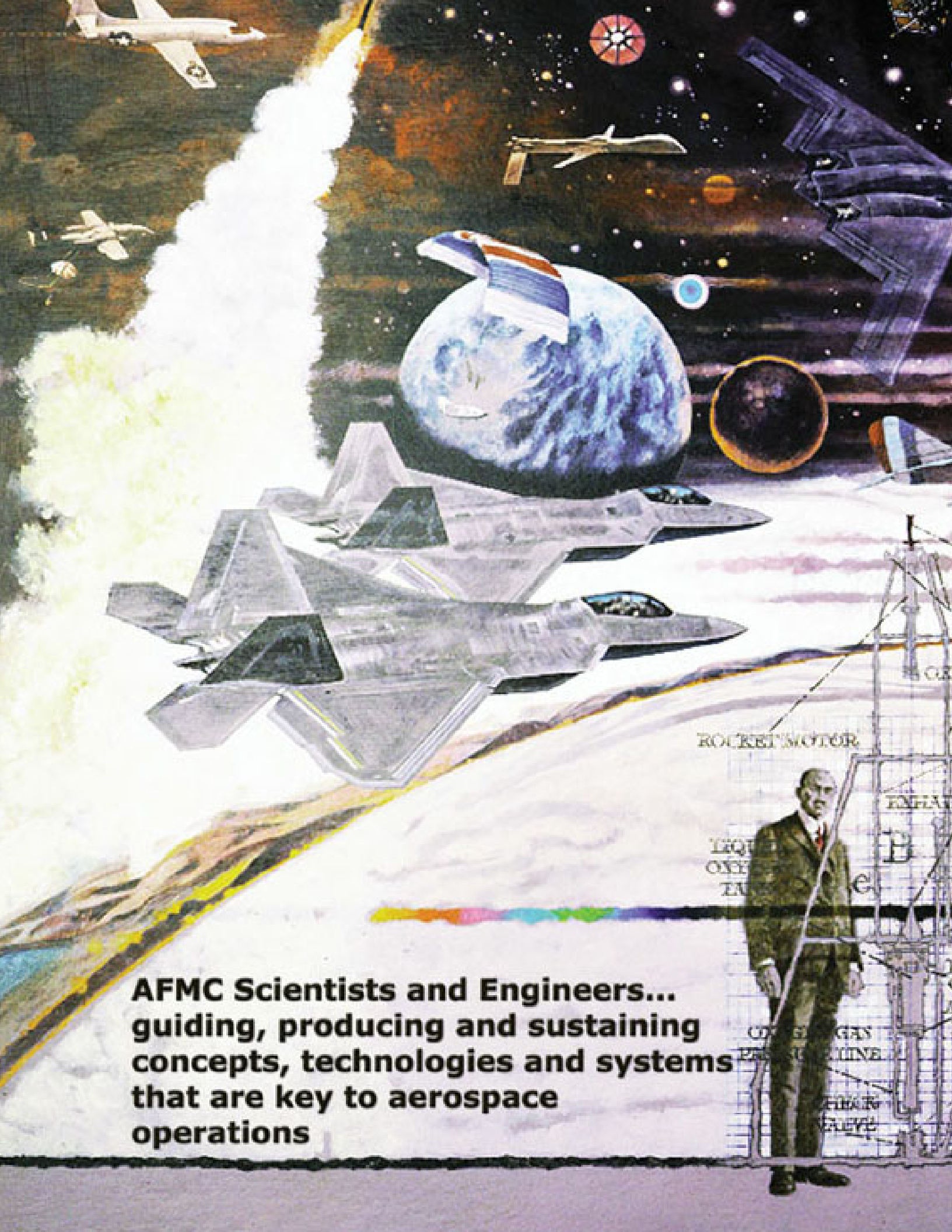
Planning to cross-train from security forces to another field while she pursues a master's degree, Senior Airman Applegate said she's asked Sgt. Carter for honor guard contacts at the technical school.

"I want to stay sharp and crisp," she said. "If they need me, I want to be ready."

And she made no bones about her commitment to the honor guard and its calling.

"I'm going to continue with the honor guard as long as I serve. If that's 20 years, I'll be in the honor guard for 20 years."

— Mr. Mike Wallace, ASC Public Affairs



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